



X-33 Critical Design Review Marks Successful Milestone

by Tony Jacob

Government and industry representatives successfully completed a comprehensive design review of the X-33 technology demonstration program, giving the program a vote of confidence and the go ahead for fabrication of all remaining components, completion of subsystems and assembly of the subscale prototype launch vehicle.

"We've had an excellent review of the program, and we're ready to go ahead with all remaining fabrication and assembly for the X-33," said NASA X-33 program manager Gene Austin of the Marshall Center.

The five-day operations and systems Critical Design Review (CDR) held this week at Edwards Air Force Base, CA, was the culmination of 51 subsystems and component CDRs held since January. Some 600 representatives from NASA, industry team lead Lockheed Martin, industry partners and the U.S. Air Force participated in this final design review of the X-33 Program. They planned the integration of the various systems and components into the operational vehicle, and finalized plans for the launch, landing and flight support infrastructure.

The review also served as an opportunity for program officials

to announce resolution of issues that arose earlier this year regarding vehicle weight and aerodynamic stability and control. Since then the X-33 team's weight reduction efforts,

modifications to the design of the vehicle's canted and vertical fins, and plans to use densified propellants to carry additional fuel have paved the way for a successful program, Austin said.

"I'm very pleased with the technical definition of the program," said Cleon Lacefield, Lockheed Martin Skunk Works X-33 program manager. "All the team members have done an outstanding job bringing together all the design elements of the program.

"We are now ready to focus on vehicle fabrication and launch site construction," Lacefield added. "We

are on schedule for the flight demonstration program to begin in mid-1999."

The flagship vehicle in NASA's Space Transportation *continued on page 3*



Artist's concept of the X-33 in flight.

CFC Contributions Exceed \$410,000 After Five Weeks

The Marshall Center's Combined Federal Campaign (CFC) passed its fifth week with employees contributing \$410,213 to charitable organizations.

"The dollar amount per person is still way up," said CFC Chairperson Steve Gaddis. "Nov. 12 is the cut-off, so there is still time to make that contribution to the agency of your choice. To those who have already given, thank you."

The CFC financial manager reported that 20 additional Center offices had 100 percent of their employees participating in the campaign.

Those offices are: CA01, CA10, CR50, ED27, EE21, EE25, EL71, EO27, EP31, EP51, ES81, GP56, JA62, JA91, PS03, RA01, RA20, RA40, SA27 and SA71.

Employee Update Scheduled for Nov. 13

An Employee Information Update will be held on Nov. 13 at 9 a.m. in Morris Auditorium. Employees are encouraged to attend the Update or view it on Center closed circuit television.



The crew of Space Shuttle mission STS-85, which includes former Marshall employee Jan Davis, will present highlights of that mission to Center employees Thursday in Morris Auditorium from 11 a.m. to noon.

Marshall To Host U.S.-Russian Space Science Symposium

by Bob Thompson

Marshall Center will host an international symposium next week showcasing the results of Russian space research sponsored by NASA. The event, Nov. 10-14, will be at the Marriott Hotel in Huntsville.

For the symposium, titled "An Interchange with the Science and Technology Advisory Council," approximately 50 Russian researchers will present their findings and conclusions from science and engineering projects funded under Phase 1 of the International Space Station Program.

NASA invites any academic, industry, or government researcher and manager involved with space research to attend. There is no registration fee.

This event marks the culmination of an international cooperative research program between the United States and Russia.

In accordance with the Gore-Chernomyrdin Agreement signed in 1994, this research was funded as a testbed for future mutual research on the upcoming International Space Station.

The symposium is sponsored by NASA's Office of Life and Microgravity

Sciences and Applications in Washington, D.C., and will be co-chaired by Associate Administrator Arnauld Nicogossian, M.D., of that office and Vladimir F. Utkin, chairman of the Science and Technology Advisory Council, the Russian organization responsible for program management and implementation of U.S.-funded space research.

"We are convinced that this program has brought us to a new era of cooperative and collaborative international research activity which will ultimately benefit all of mankind as we explore new possibilities and opportunities on the International Space Station," said Nicogossian.

U.S. and Russian space research communities will share results and discuss ideas to explore new, collaborative international research opportunities.

The first half of this four-day event will review objectives and findings of the Russian research both in general attendance sessions and in separate science discipline sessions. Leading Russian researchers and U.S. scientists engaged in comparable research will make presentations.

The second half of the symposium will

focus on what can be accomplished in the future. A panel composed of representatives from the international space science community will discuss future collaboration options and recommend possible paths to achieve international success.

The areas of research funded by this program include:

- Space Technology and Materials Science Problems
- Geophysical Research
- Space Biology and Medicine
- Earth Natural Resources and Ecology Monitoring
- Solar System Planets and Small Bodies
- Space Biotechnology
- Technical Studies and Experiments
- Space Astronomy
- Systems Engineering Analyses
- Space Power and Propulsion

Additional information on the symposium, including research progress reports, can be found on the World Wide Web at <http://www.stacresearch.org> or by contacting Kathryn Havens, Office of Life and Microgravity Sciences and Applications, Director of International Programs, of NASA Headquarters at (202) 358-4435.



Houston Hammac, left, of the Structures and Dynamics Lab, and Ning Li, University of Alabama in Huntsville, inspect a high-temperature ceramic superconducting disk after the disk was removed from the Structures and Dynamics Lab's three million pound press. The disk will be used in a scheduled series of experiments studying gravity modification. The Advanced Space Transportation Program office is interested in these experiments and technologies for any potential application to future space transportation and propulsion systems.
Photo by Terry Leibold

Final 'Sim' Caps Training for STS-87

A nine-hour joint integrated simulation on Oct. 30 marked completion of the last major event of scheduled training for crew and cadre members assigned to the STS-87/U.S. Microgravity Payload-4 Space Shuttle mission. USMP-4 is a Marshall-managed science mission.

Science teams and payload controllers supporting the USMP-4 investigations participated in the simulation from facilities at the Marshall Center, Kennedy Space Center in Florida, and from remote science operations sites at the Lewis Research Center in Cleveland, the French Space Agency in Toulouse, France and Rensselaer Polytechnic Institute in Troy, N.Y. STS-87 crew members and flight controllers participated at Mission Control-Houston.

"With the completion of the third Joint Integrated Simulation we've taken one of the last key steps toward readiness to launch the mission," said USMP-4 Mission Manager Sherwood Anderson. "The entire USMP-4 mission team has come together very well and we're ready to support the operations of this very important microgravity science mission."



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November Marks 30th Anniversary of Saturn V Launch

by Mike Wright, Marshall Historian

Sunday, Nov. 9, will mark the 30th anniversary of a milestone in the history of America's space program – the first launch of a Saturn V rocket.

The unmanned flight in 1967 was the first mission designed to qualify the Saturn V for manned flight, and the first test of the structural integrity and compatibility of launch vehicle and spacecraft.

Dr. Wernher von Braun, the first director of the Marshall Center, said "No single event since the formation of the Marshall Center in 1960 equals today's launch in significance."

The Saturn V rocket was used in July

1969 to launch the first Americans to the moon. At liftoff the vehicle produced more than 7.5 million pounds of thrust. It stood more than 360 feet tall and weighed more than 6 million pounds at liftoff. The Marshall Center was responsible for developing the Saturn V launch vehicle.

The United States had decided in 1961 to undertake a manned lunar landing effort as the focal point of a broad new program of space exploration. There was no rocket in the country at that time even approaching the needed capability, but there was something of a "test bed" in the making, the eight-engine Saturn I. It had never flown and was much too small to offer any real hope of sending a trio to the

moon, except possibly through as many as a half dozen separate launchings from Earth, and perfection of rendezvous and docking techniques, which had never been tried.

The situation brought about the announcement on Jan. 10, 1962, that NASA would develop a new rocket, much larger than any previously attempted. It would be based on the F-1 rocket engine, the development of which had been underway since 1958, and the hydrogen fueled J-2 engine, upon which work had begun in 1960.

NASA formally assigned the task of developing the Saturn V to the Marshall Center on Jan. 25, 1962.

Engine for X-33 Completes Flight

A NASA SR-71 successfully completed its first flight Friday as part of the NASA/Rocketdyne/Lockheed Martin Linear Aerospike SR-71 Experiment LASRE project at NASA's Dryden Flight Research Center, Edwards, Calif.

The SR-71 took off at 10:31 a.m. CST. The aircraft flew for one hour and fifty minutes, reaching a maximum speed of Mach 1.2 before landing at Edwards at 12:21 p.m. CST, successfully validating the SR-71/linear aerospike configuration. Linear Aerospike rocket engines are going to power the X-33 Advanced Technology Demonstrator, scheduled to fly in 1999.

LASRE is designed to gather data on the aerospike's exhaust plume as it travels through the transonic region of flight. Linear aerospike rocket engines have been laboratory- and ground-tested many times over the past 30 years, but have never flown until now.

LASRE is a one-tenth-scale, half-span model of the X-33. The model contains eight thrust cells of an aerospike engine and is mounted on a housing known as the "canoe," which contains the gaseous hydrogen, helium and instrumentation gear.

The model, engine and canoe together are called the "pod." The entire pod is 41 feet long and weighs 14,300 pounds.

This flight is the first in a series of ground-based and in-flight qualification tests. Following these tests, a decision will be made to proceed to data-collection flights of the linear aerospike or to pursue more ground testing at the U. S. Air Force Research Laboratory Propulsion Directorate, formerly Phillips Laboratory.

USMP-4 Sim Completed

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"USMP-4 is an attempt to study basic physical phenomena in materials, fundamental physics and combustion sciences without the influence of gravity," explained Mission Scientist Dr. Peter Curreri. "We're looking forward to getting the mission started." USMP-4 is targeted to fly aboard Columbia in mid November.

Nominees Sought for Positions On Marshall Exchange Council

A special nominating committee is accepting names of nominees from employees for an election to fill one position on the Marshall Exchange Council.

Names of nominees will be accepted by the committee when accompanied by a petition signed by 20 or more employees. Petitions must bear the signature of the nominee and the social security number, considered privacy act information, or Marshall badge number.

Each candidate must have served as a Marshall employee for not less than one year. The term of office is for two years.

Deadline for submitting nominations is Nov. 18. Petitions should be mailed to Exchange Council Election, CM21X, building 4752.

X-33 Critical Design Review

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Technology Enterprise, the X-33 is a subscale prototype of a full-scale, commercially developed Reusable Launch Vehicle (RLV) which Lockheed Martin has named "VentureStar," planned for development after the turn of the century. A single-stage-to-orbit RLV could dramatically reduce the cost of putting payloads into space from \$10,000 per pound to \$1,000 per pound.

"Everything we have learned leading up to our Critical Design Review about the development of this prototype vehicle will be directly applied to the design of the full-scale vehicle," Austin said. "We've already earned the price of the X-33 program for what we've learned for the RLV."

Obituary

Joseph Graham, 72, Huntsville, died Oct. 18. He retired from Marshall in 1978 where he worked in Administrative and Program Support. He is survived by his wife Bobbie J. Graham.

Employee Ads

Miscellaneous

- ★ DP AirToner exercise bike \$75. 881-0551
- ★ Kerosene heater, round type, 5 gal. can and pump \$75; Antique trunk with cedar shelf \$40; Fertilizer broadcaster \$10. 880-9025
- ★ 1997 Holiday Barbie, new in box \$75. 233-4680
- ★ Aluminum 32ft. extension ladder \$150. 539-6114
- ★ Berkline loveseat, green \$200, Nordic Track Excel \$250. 890-0499
- ★ Sofa/sleeper, chair, informal \$75 for all, Tandy computer system with printer \$100. 882-9785
- ★ 1993 Belmont Premier, size 14 x 70, 2-BR, 2-bath, central air/heat \$13,500. 379-2530
- ★ 96 bales of orchard grass & clover hay, \$3 a bale. 423-2557

Vehicles

- ★ 1990 Plymouth Voyager, 102K miles, PS, PB, cassette, cruise, one owner, \$4,100. 883-1693
- ★ 1988 Ford Ranger, p/u-truck, 2.3 liter, 5-spd, s.w.b., 89K miles, black/ext, tan/int., fresh paint, spt/wheels \$2,875 o.b.o. 753-2278
- ★ 1996 Corsica, automatic, a/c, gray, 38K miles, 4-DR. 852-7982
- ★ 1989 4 x 4 Dodge Power Ram, new engine, 6,000 miles, warranty, 69K original miles \$4,500. 223-1119
- ★ 1990 Pontiac Grand-Am, 169K miles, blue, air, PS, PB, PW, tape \$2,700. 729-6231
- ★ 1991 Buick Regal, 4-DR, 31K miles, white, automatic, 3.8L, V-6, PS, PB, cassette \$7,900. 881-5736
- ★ 1992 Dakota, extended cab, 35K miles, \$10,750; 1993 Escort wagon \$7,000; 1976 Porsche 914 \$7,500. 233-4680
- ★ 1991 Cadillac Sedan Deville, white, blue leather, gold package, 73K miles \$9,200. 852-6952
- ★ 1991 Mazda RX-7 Coupe, 58K miles, dealer serviced, security system, sunroof, alloys. 881-0645
- ★ 1983 Chevrolet 20 series conversion van, 300 CID, V-8, A/T, PS, PB, AC, CB \$3,200. 881-6040
- ★ 1984 Ford T-Bird, automatic, all power, baby blue \$2,000. 881-4527 after 6 p.m.
- ★ 1987 Chrysler Fifth Avenue, full power, new brakes, white, leather \$2,300. 586-3909

Wanted

- ☞ Fax Machine. 837-0085
- ☞ Sextant and a surveying transit or level. 881-6040

MARSHALL STAR

Marshall Space Flight Center, Alabama 35812

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Found

- ☞ Man's Sutter & Grant black & white plaid sport coat, size 42L, in Bldg. 4200 call 4-3281 to identify.
- ☞ Watch found in building 4200, call 4-4758 to identify.

Free

- ☞ Two dogs, spayed, looking for good home, moving. 539-6114

Center Announcements

- ★ **MARS Dance Club** — The MARS Ballroom Dance Club is offering Foxtrot and Tango lessons (\$8 per person) from 7 to 8 p.m. Nov. 10, 17, and 24. The classes will be held in the Parish Hall of Saint Stephen's Episcopal Church at 8020 Whitesburg Drive. These lessons are available to club members and their partners/guests. For more info. call Pat Sage at 544-5427.
- ★ **Annual Nut Sale** — MSFC is offering the opportunity for Marshall employees, retirees, and on-site contractors to purchase pecans (fancy mammoth halves), for \$4.85 for the 16 oz. bag; chocolate-covered pecans for \$6.75 per lb.; hickory smoked almonds for \$3.90 per lb.; roasted, salted (in shell) natural pistachios for \$3.45 per lb.; natural, whole almonds for \$3.90 per lb.; English walnuts for \$4.40 per lb.; jumbo raw peanuts for \$1.75 per lb.; honey roasted almonds for \$3.90 per lb. and dry roasted cashews at \$5.40 per lb. They will go on sale weekdays from 8 a.m. until 4 p.m. beginning Nov. 21 in the MSFC Activities Building (4752) on a first-come/first-served basis.
- ★ **American Education Week** — MSFC civil service employees who are involved in providing on-going support to the educational community are invited by the Center to a recognition ceremony and reception in their honor on Nov. 20. The reception will be held from 12:30 to 2 p.m. in the south end of Bldg. 4755. Employees who serve the educational community and can attend the reception may confirm their attendance by e-mail to the Education Program Office at the following address: tammy.rowan@msfc.nasa.gov.
- ★ **FEHB** — The Federal Employee Health Benefits open season will begin Nov. 11 thru Dec. 8. Comparison charts and brochures will be available through your administrative office

starting approximately the first week in November.

- ★ **NCMA** — The Huntsville Chapter of the National Contract Management Association will hold a luncheon on Nov. 20 from 11:30 a.m. to 1 p.m. at the Sheraton Four Points located at the Huntsville Airport. Rep. Bud Cramer, congressmen from the 5th District of Alabama, will be the speaker. Registration begins at 11:15 a.m. and luncheon will be served at 11:30. Cost is \$10 for members and \$12 for guests. For reservations call 533-3954 by Nov. 17.
- ★ **25th Symposium on Government Acquisition** — The North Alabama Chapter, Federal Bar Association, is sponsoring a symposium on "Recent Developments in Government Contracting" on Nov. 19-20 from 8 a.m. to 4:45 p.m. at the Sheraton Four Points located at the Huntsville Airport. Participants will be on their own for lunch on Nov. 19. A luncheon is scheduled with a presentation from Rep. Bud Cramer for Nov. 20. The cost is included in the registration fee. Registration will be from 8 to 8:30 a.m. Contact John Henningsen at 842-0534 for more information.
- ★ **1997-98 Hoops** — The 1997-98 MSFC basketball season is underway. The league will be structured as it has been in the past with three divisions and will begin in late November and run through March. If you are interested in entering a team or if you are looking to join a team, call Chris Calfee at 4-5788 or e-mail at chris.calfee@msfc.nasa.gov.
- ★ **MARS Fishing Club** — The MARS Fishing Club held its annual classic tournament on Oct. 26. The results are as follows: 1st place - Ken Anthony/Don McQueen, 2nd place - Deon Smith/Mike Vanhooser, 3rd place - Charles Nola/John Pea, big fish - Ken Anthony. Our last MSFC tournament of the season will be a "live bait" bass tournament at First Creek on Nov. 8. Please contact Don McQueen (4-9073) or Ross Evans (5-2305) for more information.

Job Opportunities

CPP 98-2-PL, Education Program Specialist, GS-1720-7, with promotion potential to GS-12. Human Resources & Administrative Support, Education Programs Office. Closes Nov. 14.

CPP 98-6-RE, Equal Employment Manager, GS-260-15. Equal Opportunity Office. Closes Nov. 10.

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